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EXAMINER

ROMAN, LUIS ENRIQUE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Applicant amendment filed on 11/30/07 has been entered. Accordingly no claims have been kept original, claims 1-2 & 8 have been amended , claims 2-7, 9-12, 14-21, 23-24, 28-39 & 42-43 have been previously presented and claims 22 & 40 have been cancelled. New claims 44-45 were added new. It also included remarks/arguments.

Claim Objections

Claims 42-43 are depending on a cancel claim 40.

For further examination the examiner assumed they are depending on claim 27.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-2 & 26 are rejected under 35 U.S.C. § 102(b) as being anticipated by Shinoda (US 4779036).

Regarding claims 1 & 26 Shinoda discloses a method (a person of the ordinary skill will understand a method that is intrinsically described by the functioning of the apparatus) for controlling an SCR-type switch (Fig. 5 elements 70a-f), comprising applying on the switch gate several periods of an unrectified high frequency voltage in succession (Col. 5 lines 11-17 & Fig. 8F), the power of each halfwave of the several periods being individually insufficient to start the SCR-type switch (Fig. 8F shows a

frequency burst or plurality of halfwaves to provide sufficient energy to start the SCR-type switch); the accumulated effect on the SCR-type switch of applying the several periods in succession to start the SCR-type switch is an inherent characteristics of the SCR-type switch. The SCR-type switch has N-P junctions which inherently comprise parasitic capacitances, which inherently comprise parasitic capacitances that generate an accumulated effect of charges when a voltage is present at the electrodes.

An evidence of the presence of this capacitances the examiner provides the following US patents: Dumont et al. (US 4459531) Col. 4 line 61 to Col. 5 line 15, Yakushiji et al. (US 4982259) Col. 1 lines 31-38) and Croft (US 5546038) Col. 4 lines 46-58 & Figs. 1A-1C).

Regarding claim 2 Shinoda discloses the method of claim 1, wherein the high frequency voltage oscillates at a selected frequency between 10 kHz and a few GHz (Col. 5 lines 67-68).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3-6 are rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Yuan et al. (Patent Application Publication US 2002/0066904 A1).

Regarding claim 3 Shinoda discloses the method of claim 1.

Shinoda does not disclose wherein the high frequency is applied via an insulating layer formed above a sensitive area of the component.

Yuan et al. teaches wherein the high frequency voltage is applied via an insulating layer (Pg. 3 paragraph 33-34 & Fig. 1 element 104) formed above a starting area of the component (Pg. 3 paragraph 33-34 & Fig. 1 element 102).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda device with the Yuan et al. device features because both teach how to efficiently control the triggering of an semiconductor switch and the configuration of the radiation sensitive device (photodetector) of Yuan et al. provides an apparatus with better isolation which will prevent erroneous triggering of the switch.

Regarding claim 4 Shinoda in view of Yuan et al. disclose the method of claim 3. Yuan et al. further discloses wherein the high frequency voltage is applied above a gate region of a thyristor (Col. 4 paragraph 45).

Regarding claim 5 Shinoda in view of Yuan et al. disclose the method of claim 3. Yuan et al. further discloses wherein the high frequency voltage is applied above a gate region of a triac (Col. 4 paragraph 45).

Regarding claim 6 Shinoda in view of Yuan et al. disclose the method of claim 3. Shinoda further teaches wherein the high frequency voltage is applied via a high-frequency line having terminals for connection to the high frequency voltage (Fig. 5 elements 70 a-f).

Claim 7 is rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Yuan et al. (Patent Application Publication US 2002/0066904 A1) and Spink (US 3824444).

Regarding claim 7 Shinoda in view of Yuan et al. disclose the method of claim 3.

Shinoda in view of Yuan et al. does not disclose wherein the high frequency is applied via a winding thru an external connection of the device.

Spink teaches wherein the high frequency voltage is applied via a winding that generates a magnetic field or responds to a magnetic field (Fig. 1 elements GT1, GT2, GT3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda and Yuan et al. device with the winding of Spink to provide better isolation for the control gate of the semiconductor.

Claims 8-11, 13-15 & 17-23 are rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Iwamuro et al. (US 6091087).

Regarding claims 8 & 13 Shinoda discloses an SCR-type switch component (a person of the ordinary skill will understand a method that is intrinsically described by the functioning of the apparatus) (Fig. 5 elements 70a-f), comprising two main electrodes (Fig. 5 anodes and cathodes of elements 70a-f) and at least one control electrode (Fig. 5 gates of elements 70a-f) controlling the SCR-type switch component in response to an unrectified high frequency power supply that supplies (Col. 5 lines 11-17 & Fig. 8F, shows a frequency burst to provide sufficient energy to start the SCR-type switch); the accumulated effect on the SCR-type switch of applying the several periods in succession to start the SCR-type switch is an inherent characteristics of the SCR-type switch. The SCR-type switch has N-P junctions which inherently comprise parasitic capacitances, which inherently comprise parasitic capacitances that generate an accumulated effect of charges when a voltage is present at the electrodes.

Shinoda does not specifically disclose that the SCR-type switch component with the gate formed on an insulating layer that insulates the control electrode from a starting region of the component (for claim 8).

Shinoda does not specifically disclose that the control of the SCR-type switch controls without supplying current from the control terminal to the starting area of the SCR-type switch (for claim 13).

Iwamuro et al. teaches an insulated gate thyristor (Fig. 1), which has the gate, formed on an insulating layer that insulates the control electrode from a starting region of the component (9 <oxide film>, 10 <gate electrode>). Because of this insulation, there is no current supplied to the starting region of the component.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda device with the insulated gate thyristor of Iwamuro et al. because it greatly contributes to reduction of switching losses in a power switching apparatus using these devices (Iwamuro et al.;Col.18 lines 33-36).

Regarding claim 9 Shinoda in view of Iwamuro et al. discloses the SCR-type switch component of claim 8.

Iwamuro et al. further discloses wherein the control electrode is arranged above a gate region of a thyristor (Fig. 1).

Regarding claim 10 Shinoda in view of Iwamuro et al. discloses the SCR-type switch component of claim 8 but does not disclose wherein the control electrode is arranged above a gate region of a triac.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda device with a triac because a thyristor provides only unidirectional rectification and a triac would provide bidirectional rectification. Note that a triac is a configuration of a pair of thyristors connected back to back.

Regarding claim 11 Shinoda in view of Iwamuro et al. discloses the SCR-type switch component of claim 8.

Shinoda further teaches wherein the control electrode is a high-frequency line having terminals for connection to the high frequency power supply (Col. 6 lines 7-13 & Fig. 5 elements 70 a-f).

Regarding claim 14 Shinoda in view of Iwamuro et al. discloses the SCR-type switch component of claim 13.

Shinoda further discloses wherein the high frequency voltage oscillates at a selected frequency between 10 kHz and a few GHz (Col. 5 lines 67-68).

Regarding claim 15 Shinoda in view of Iwamuro et al. discloses the claimed invention except for the range of 1 MHz or higher. It would have been obvious to one having ordinary skills in the art at the time the invention was made to increase the workable range from 10 KHz to 1 MHz or higher, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 17 Shinoda in view of Iwamuro et al. discloses the method of claim 13.

Iwamuro et al. further teaches wherein the control terminal is insulated from the starting area (Fig. 1 elements 9 & 10).

Regarding claims 18-21 Shinoda in view of Iwamuro et al. discloses the method of claims above.

Shinoda further teaches wherein the high-frequency control voltage comprises a plurality of halfwaves, wherein each one of the plurality of halfwaves is individually insufficient to turn on the SCR-type switch (Col. 5 lines 11-17 & Fig. 8F shows a frequency burst or plurality of halfwaves to provide sufficient energy to start the SCR-type switch). Note that the power, voltage and duration of a signal are all related to the

energy provided to the switch, which has a minimal value to each in order to be turned on.

Regarding claim 23 Shinoda in view of Iwamuro et al. discloses the method of claim 13.

Shinoda further discloses wherein the high-frequency control voltage is unrectified (Fig. 8F).

Claims 12 & 24 are rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Iwamuro et al. (US 6091087) and Spink (US 3824444).

Regarding claim 12 Shinoda in view of Iwamuro et al. discloses the SCR-type switch component of claim 8.

Shinoda in view of Iwamuro et al. does not disclose wherein the high frequency is applied via a winding that generates a magnetic field or responds to a magnetic field.

Spink teaches wherein the high frequency is applied via a winding that generates a magnetic field or responds to a magnetic field (Fig. 1 elements GT1, GT2, GT3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda in view of Iwamuro et al. device with the winding of Spink because this device is in the same solving problem area and provides better isolation for the control gate or connection of the semiconductor.

Regarding claim 24 Shinoda in view of Iwamuro et al. discloses the method of claim 13.

Spink teaches wherein the high frequency is applied via a winding that generates a magnetic field or responds to a magnetic field (Fig. 1 elements GT1, GT2, GT3).

Claim 16 is rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Iwamuro et al. (US 6091087) and J. A. Nuckolls (US 3344310).

Regarding claim 16 Shinoda in view of Iwamuro et al. discloses the method of claim 13 but does not teach wherein the high frequency control voltage is provided to the control terminal through a capacitor.

J. A. Nuckolls teaches controlling an SCR-type switch (Fig. 1 elements 7 & 8) wherein the high frequency control voltage is provided to the control terminal through a capacitor (Fig. 1 elements 56 & 57).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda in view of Iwamuro et al. device with the capacitor of J. A. Nuckolls because it provides isolation from the circuit by providing AC coupling.

Claims 25, 44-45 are rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of J. A. Nuckolls (US 3344310).

Regarding claim 25 Shinoda discloses the claimed invention (a person of the ordinary skill will understand a method that is intrinsically described by the functioning of the apparatus) except for having the control signal provided to the gate through a capacitor, and at a frequency of 1 MHz or higher.

J. A. Nuckolls discloses controlling the SCR-type wherein the control signal is provided to the gate through a capacitor (56 & 57).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda device with the teachings of J. A. Nuckolls in order to avoid undesirable self triggering Col. 2 lines 48-61).

Shinoda in view of J. A. Nuckolls discloses the claimed invention except for the range of frequency of 1 MHz or higher. It would have been obvious to one having ordinary skills in the art at the time the invention was made to increase the workable range from 10 KHz to 1 MHz or higher, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claims 44-45 Shinoda further discloses providing to the SCR-type switch a plurality of halfwaves of high frequency voltage in succession (Fig. 8F shows a frequency burst or plurality of halfwaves in succession) creating an accumulated effect to turn on the SCR-type switch; the accumulated effect on the SCR-type switch of applying the several periods in succession to start the SCR-type switch is an inherent characteristic of the SCR-type switch. The SCR-type switch has N-P junctions which inherently comprise parasitic capacitances that generate an accumulated effect of charges when a voltage is present at the electrodes.

Claims 27-28, 33-39 & 41-43 are rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Bhagat (US 4630092).

Regarding claim 27 Shinoda discloses an SCR-type switch component (Fig. 5 elements 70a-f), comprising two main electrodes (Fig. 5 anodes and cathodes of elements 70a-f) and at least one control electrode (Fig. 5 gates of elements 70a-f) controlling the SCR-type switch component in response to an unrectified high frequency power supply (Col. 5 lines 11-17 & Fig. 8F, shows a frequency burst to provide sufficient energy to start the SCR-type switch); the SCR-type switch is controlled by applying a a high-frequency control voltage to the control electrode (Col. 5 lines 66-68), the accumulated effect on the SCR-type switch of applying the several periods in succession to start the SCR-type switch is an inherent characteristics of the SCR-type switch. The SCR-type switch has N-P junctions which inherently comprise parasitic capacitances, which inherently comprise parasitic capacitances that generate an accumulated effect of charges when a voltage is present at the electrodes.

Shinoda does not specifically define the starting region and insulating region.

Bhagat teaches a starting region (Fig. 2 elements 32, 34, 36) and insulating region (Fig. 2 elements 40, 46).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda device with the insulated gate thyristor of

Bhagat because this thyristor with insulated an gate provides rapid turn-off even when the anode voltage stays high (Bhagat <Col. 1 lines 66-68>).

Regarding claim 28 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further discloses wherein the first control electrode is completely insulated from the starting region (Fig. 2 elements 42, 40, 46)

Regarding claim 33 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further discloses wherein the first control electrode is insulated, via the insulating layer, from a semiconductor substrate in which semiconductor layers of the SCR-type switch component are formed (Fig. 2).

Regarding claim 34 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further discloses a second control electrode that is insulated from the starting region by the insulating region (Fig. 2 elements 42, 40, 46)

Regarding claim 35 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further discloses wherein the starting region comprises a first region of a first conductivity type (Fig. 2 element N) and a second region of a second conductivity type (Fig. 2 element P), wherein the first control electrode is closer to the first region than to the second region (Fig. 2 element 44, N), and wherein the second control electrode is closer to the second region than to the first region (Fig. 2 element 42, PN).

Regarding claim 36 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further discloses wherein the first control electrode contacts the insulating region (Fig. 2 elements 44, 40, 46).

Regarding claim 37 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further discloses wherein the insulating region contacts the starting region (Fig. 2 elements 40, N).

Regarding claim 38 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27 but does not disclose wherein the control electrode is arranged above a gate region of a triac.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda in view of Bhagat device with a triac because a thyristor provides only unidirectional rectification and a triac would provide bidirectional rectification. Note that a triac is a configuration of a pair of thyristors connected back to back.

Regarding claim 39 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Shinoda further teaches wherein the SCR-type switch is a thyristor (Fig. 5 elements 70a-f).

Regarding claim 41 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Shinoda further teaches wherein the effect of the plurality of halfwaves of the high-frequency control voltage being applied to the control electrode close enough in time (high-frequency) and large enough in intensity such that the accumulated effect of the plurality of halfwaves gradually increases over time and thereby turns on the SCR-type switch, wherein the SCR-type switch is not turned on in a response to an effect of an individual one of the plurality of halfwaves applied by itself (Col.5 lines 11-17 & Col.

5 line 53 to Col. 6 line 2). The accumulated effect on the SCR-type switch of applying the several periods in succession to start the SCR-type switch is an inherent characteristics of the SCR-type switch. The SCR-type switch has N-P junctions which inherently comprise parasitic capacitances, which inherently comprise parasitic capacitances that generate an accumulated effect of charges when a voltage is present at the electrodes.

Regarding claim 42 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27 except for the range of 1 MHz or higher. It would have been obvious to one having ordinary skills in the art at the time the invention was made to increase the workable range from 10 KHz to 1 MHz or higher, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Regarding claim 43 Shinoda in view of Bhagat discloses the SCR-type switch of claim 27.

Bhagat further teaches wherein the high-frequency control voltage controls the SCR-type switch without supplying current from the control terminal to the starting area (Fig. 2 elements 40, 46 <these insulations do not allow conduction of current>).

Claim 29 is rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Bhagat (US 4630092) and Spink (US 3824444).

Regarding claim 29 Shinoda in view of Bhagat disclose the SCR-type switch method of claim 27.

Shinoda in view of Bhagat does not disclose wherein the control electrode is inductively coupled to the starting region via the insulating region.

Spink teaches wherein the control electrode is inductively coupled to the starting region via the insulating region (Fig. 1 elements GT1, GT2, GT3).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda in view of Bhagat device with the winding of Spink to provide better isolation for the control gate of the semiconductor.

Claims 30-32 are rejected under 35 U.S.C. §103(a) as being unpatentable over Shinoda (US 4779036) in view of Bhagat (US 4630092) and J. A. Nuckolls (US 3344310).

Regarding claim 30 Shinoda in view of Bhagat discloses the SCR-type switch method of claim 27.

Shinoda in view of Bhagat does not disclose wherein the first control electrode is capacitively coupled to the starting region via the insulating region.

J. A. Nuckolls teaches disclose wherein the first control electrode is capacitively coupled to the starting region via the insulating region (Fig. 1 element 56).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the Shinoda in view of Bhagat device with the capacitor of J. A. Nuckolls because it provides isolation from the circuit by providing AC coupling.

Regarding claim 31 Shinoda in view of Bhagat and J. A. Nuckolls discloses the SCR-type switch method of claim 30.

Bhagat further teaches wherein the first control electrode contacts the insulating region (Fig. 2 elements 44, 40).

Regarding claim 32 Shinoda in view of Bhagat and J. A. Nuckolls discloses the SCR-type switch method of claim 31.

Bhagat further teaches wherein the insulating region contacts the starting region (Fig. 2 elements 40, 32, 34, 36).

Response to Arguments

Applicant's arguments filed 1-21, 23-39 & 41-43 have been fully considered but they are not persuasive. Shinoda describe a situation where one pulse is not enough to start on the SCR-type switch, and as a result applies to the control electrode of the SCR-type switch a high-frequency signal of 20 KHz so the switch can be reliably turned on. The accumulated effect on the SCR-type switch of applying the several periods in succession to start the SCR-type switch is an inherent characteristics of the SCR-type switch. The SCR-type switch has N-P junctions which inherently comprise parasitic capacitances, which inherently comprise parasitic capacitances that generate an accumulated effect of charges when a voltage is present at the electrodes.

An evidence of the presence of this capacitances the examiner provides the following US patents: Dumont et al. (US 4459531) Col. 4 line 61 to Col. 5 line 15, Yakushiji et al. (US 4982259) Col. 1 lines 31-38) and Croft (US 5546038) Col. 4 lines 46-58 & Figs. 1A-1C).

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Art Unit: 2836

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Luis E. Román whose telephone number is (571) 272-5527. The examiner can normally be reached on Mon – Fri from 7:15 AM to 3:45 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Sherry can be reached on (571) 272-2084. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from Patent Application Information Retrieval (PAIR) system.

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LR/020408

/Michael J Sherry/
Supervisory Patent Examiner, Art Unit 2836

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Examiner, Art Unit 2836